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CONCRETE CONSTRUCTION ON THE LIVE-STOCK FARM.

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CONCRETE CONSTRUCTION ON THE LIVE-STOCK FARM.

INTRODUCTION.

Some of the increased cost of living may be traced directly to the decreased producing power of the farm lands. This condition has been largely brought about by delivering the harvested crop direct to the market and returning nothing to the fields. The problem of restoring the soil to its former fertility, together with the advanced price of meats, makes it highly profitable for every farmer to raise a certain amount of live stock. The manure thus produced, properly cared for and distributed, returns to the cultivated land a large part of the fertility which the crop of grain removed. From the sale of his live stock the farmer realizes a direct profit on his grain consumed, and also, through the use of the manure, increases the fertility of his fields.

During the period of cheap lands and grains, animals were generally allowed to run at large and were fed for the market only when they happened to be large enough. Feeding consisted in hauling out the feed and dumping it down in what seemed the least muddy spot on that particular morning. This method, as compared with feeding on the bare ground in lots, had this merit: Whatever the stock did not eat, together with the droppings, was scattered over the pasture instead of being allowed to pile up and to leach or wash away with the heavy rains. However, from the present standpoint of high-priced lands and grain, such methods of feeding are too wasteful. The feed becomes mixed with mud and is not so good for the animal. By tramping and rooting for fragments the next season's growth of grass is damaged by the animals and weeds are given an opening. In addition, the stalks, husks, cobs, and other manure from feeding should be returned to the cultivated fields which are in immediate need of fertilizing material.

REQUIREMENTS OF A GOOD FEEDING FLOOR.

The value of the feeding floor was long ago recognized. The difficulty has been to obtain a floor that would possess all of the necessary qualities without any accompanying disadvantages.

Such a floor must save the fragments of feed dropped upon its surface and keep them clean, so that such particles may be eaten by some animal.

It must be capable of being easily cleaned and disinfected, so that it may never become dangerous to the health of the animal feeding from it.

Its surface must be such that none of the manure deposited on it will be absorbed and that all of it may be easily removed for storage.

The cost of the floor must be moderate.

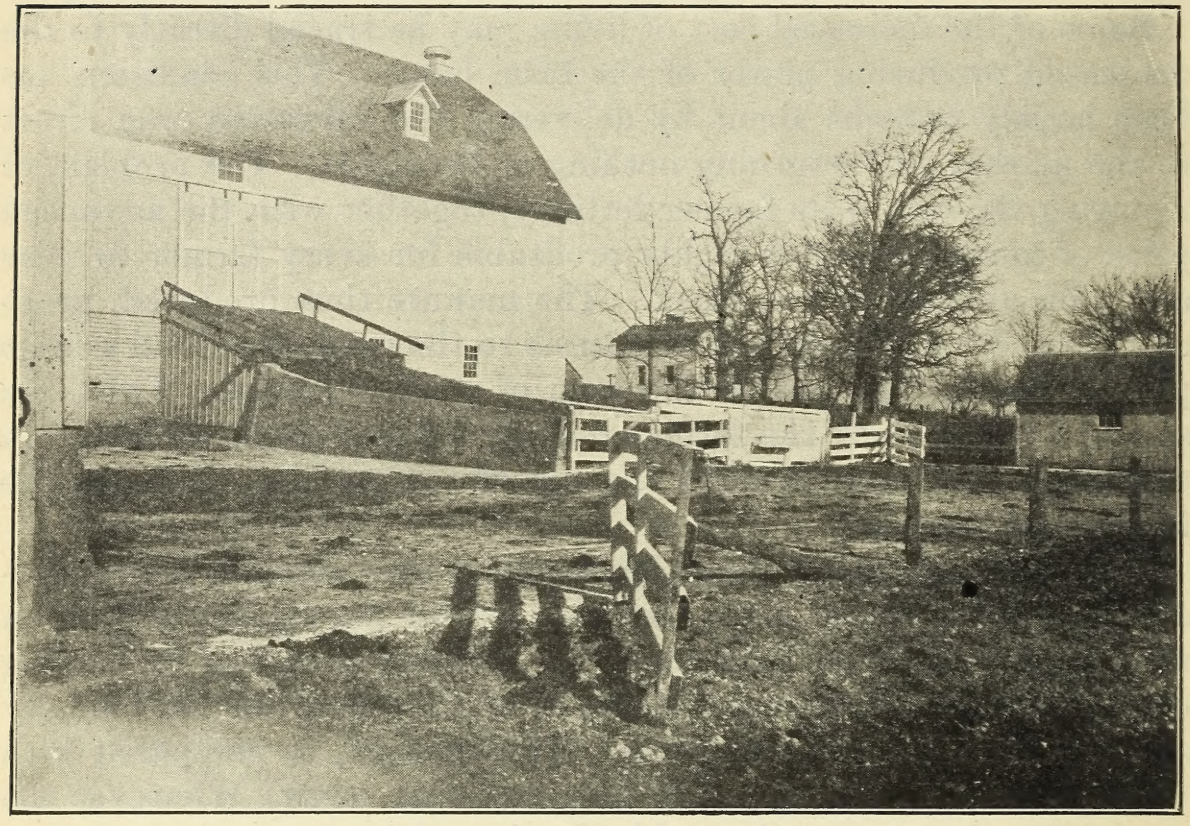

FIG. 1.—A good feeding floor.

THE ADVANTAGES OF CONCRETE FLOORS.

As a building material concrete is most valuable for floor construction.

Concrete floors are moderate in first cost; they last forever. All of the manure deposited upon them is easily removed for storage.

Their surface is such that they can be cleaned and disinfected with ease. Through their use the farm is freed of foul, muddy barn lots, the breeding place of disease—spreading gnats, flies, and mosquitoes. Likewise, rats and other destructive animals can find no home about concrete floors.

The saving of grain, of labor, and of manure is so great to the feeder that concrete floors may pay for themselves in the short space of one year.

With the use of concrete floors the general appearance of the farm is improved, the disagreeableness of wading through mud and mire is obviated, and farm life in general is made more attractive.

HOW TO BUILD CONCRETE FEEDING FLOORS.

THE SELECTION OF THE MATERIALS.

Sand for concrete should be clean and should have grains grading in size from fine to coarse. Such material as drift sand, with all fine, light grains, makes very weak concrete. Sand which will considerably discolor the hands when a portion is rubbed between the palms should not be used unless well washed. With dirty sand no amount of cement will make strong concrete.

Bank-run gravel, just as dug from the pit or taken from the stream bed, seldom runs even and rarely has the right proportion of sand and pebbles for making the best concrete. The mixture most suitable has one part sand to two parts gravel, measured by volume, in which all sizes passing through a quarter-inch screen are considered sand. As there is generally too much sand for the gravel, it is advisable to separate[1] the sand from the gravel and later to remix them in the proper proportion. For concrete feeding floors no pebbles larger than 1 inch should be used. The larger stones will do for the foundation. Gravel should have no rotten stone and should be clean, that the cement may adhere to it tightly.

The best stone for crushed rock is one which is clean, hard, breaks with sharp angles, and to which mortar easily sticks. Trap, granite, and hard limestone are among the best. The use of shale, slate, and very soft limestones and sandstones should be avoided. The crushed rock should be screened only enough to remove the very fine dust. The small particles should be left in the stone and allowance made for them in proportioning the amount of sand.

On account of its cheapness, uniformity, and quick development of strength, Portland cement is practically the only kind now used. Many brands of Portland cement are on the market, from which the farmer should select some well-known make, guaranteed by the local dealer to meet the standard specifications for cement of the United States Government, to be obtained from the United States Bureau of Standards, Washington, D. C.

Cement takes up water so easily that it must never be stored on the ground or be exposed to driving rains or moisture-laden drafts

[1] Because cement is cheap, many farmers prefer to use a little more cement and not to screen the gravel. However, by screening they will obtain a stronger concrete and at the same time make a saving in cement more than equal to the cost of screening.

of air. Figure 2 shows a very good method of storing cement. Within a building, place blocks or timbers close together upon the regular floor and upon these timbers lay a loose floor. (Remember that, though small, a sack of cement is heavy. Do not pile it too high, and never against the walls of buildings.) Pile the cement upon the raised floor and keep it covered with canvas or roofing paper. Cement once wet sets up and is unfit for use. However, lumps caused by pressure in the storehouse must not be mistaken for set-up cement. Such lumps are easily crumbled.

Any good-tasting drinking water is suitable for concrete.

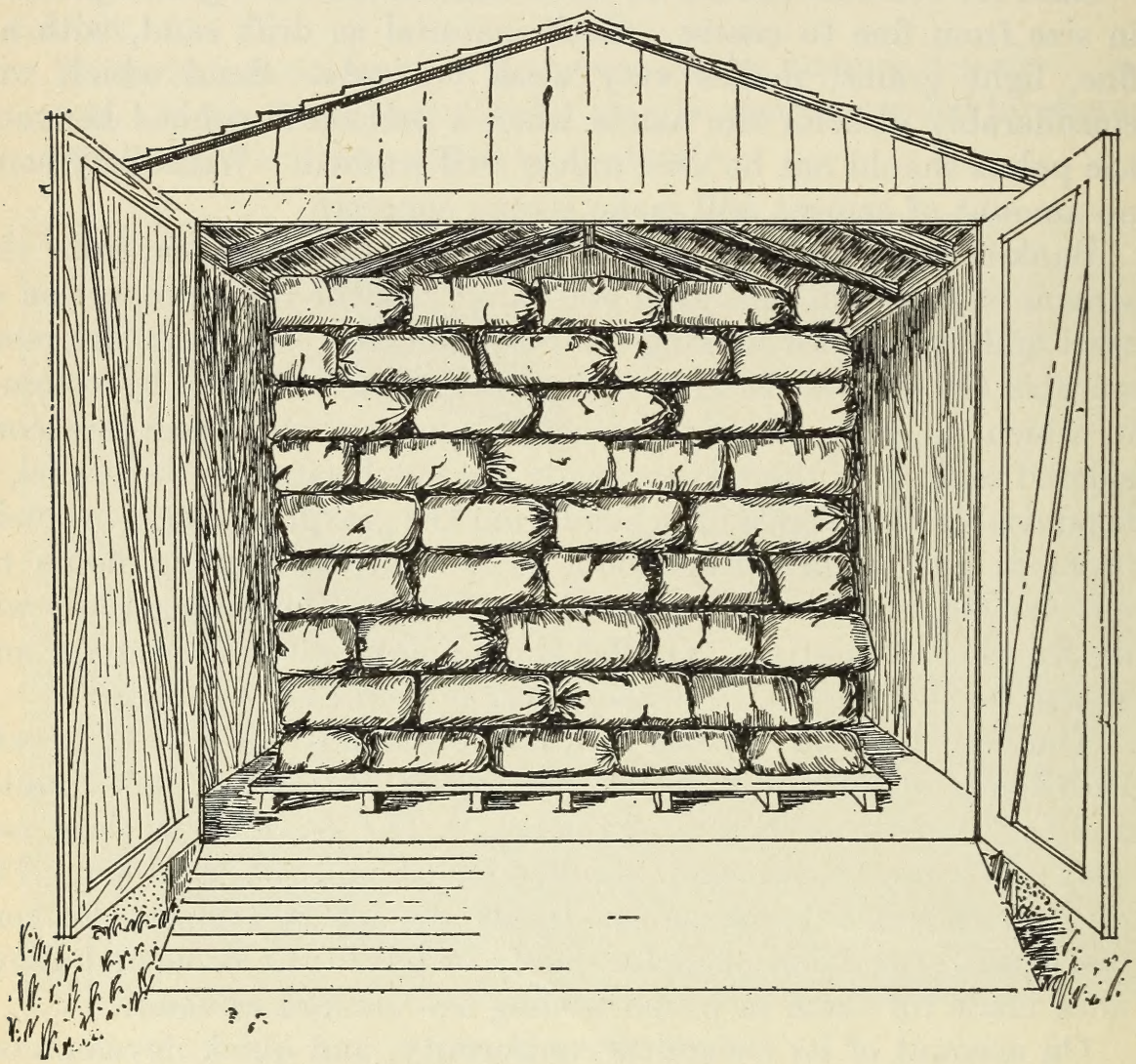

FIG. 2.—The proper way to store cement.

CHOOSING THE LOCATION OF THE FLOOR.

In choosing the site for a feeding floor, consider the following points:

(1) The natural drainage of the ground, due to its gentle slope.

(2) The convenience with regard to the feed supply.

(3) The nearness to the animal sheds, barns, or houses.

(4) The means for watering the stock upon the floor.

(5) The protection from winter winds afforded the site by surrounding buildings, wind walls, or fences.

Having chosen the location of the floor, haul the materials (slightly more than the actual amount required) at odd times and pile so as—

(1) To make the least work in wheeling to the floor.

(2) To be on the side most convenient to the water supply for mixing.

(3) To allow room for the future location of the mixing board.

THE DRAINAGE FOUNDATION.

Where the ground never freezes, drainage foundations are entirely unnecessary. If the location of the floor is poorly drained it is a wise precaution to remove the earth to a depth not less than 4 inches and to tamp in its place a fill of coarse gravel, crushed rock, broken tile, or brickbats. This will prevent upheaval by frost and consequent cracking of the floor. By this arrangement the floor will be its own thickness above the surrounding ground, which is a desirable feature.

THE TOOLS AND EQUIPMENT NECESSARY.

All of the tools and equipment necessary for making a concrete feeding floor are already at hand on most farms or will be useful afterwards for other things. Following is a list:

2 square pointed "paddy" shovels No. 3.
1 round pointed tiling shovel or 1 garden spade.
1 heavy garden rake.
1 sprinkling can or bucket, or 1 spray nozzle for hose.
1 water barrel or a length of hose.
1 sidewalk tamper or homemade wooden tamper.
1 wooden float (a homemade wooden trowel).
1 sand screen made of a section of ¼-inch wire mesh nailed to a wooden frame.
1 measuring box or frame. (See "Proportioning and mixing," below.)
1 mixing board. (See "Proportioning and mixing," below.)
Lengths of 2-inch lumber for forms for floor.
2 wheelbarrows. (Steel trays are better than wooden.)

THE PROPORTIONING AND MIXING OF THE CONCRETE.

A fairly rich mixture makes the best concrete floors. Mix bank-run gravel 1 to 5—that is, 1 part of Portland cement to 5 parts of gravel by actual measurements.[1] With screened gravel or crushed rock the materials should be mixed 1 to 2½ to 5—that is, 1 part Portland cement to 2½ parts screened sand to 5 parts screened gravel or crushed rock. While doing concrete work in hot weather the pile of crushed rock should be kept thoroughly wet.

In measuring the quantities, splitting of bags of cement may be avoided by bearing in mind the fact that a sack of cement (emptied loosely) practically fills a box holding 1 cubic foot. Therefore make

[1] Measurement by counting shovelfuls is poor and uncertain practice. Be exact.

all measurements of sand, gravel, and crushed rock in even cubic feet. Gauge the wheelbarrows by using a bottomless box holding 1 cubic foot, or construct a shallow bottomless frame which, when set on the mixing board and filled, will contain the *full* amount of sand or *one-half* the quantity of gravel or crushed rock required for one batch of concrete.

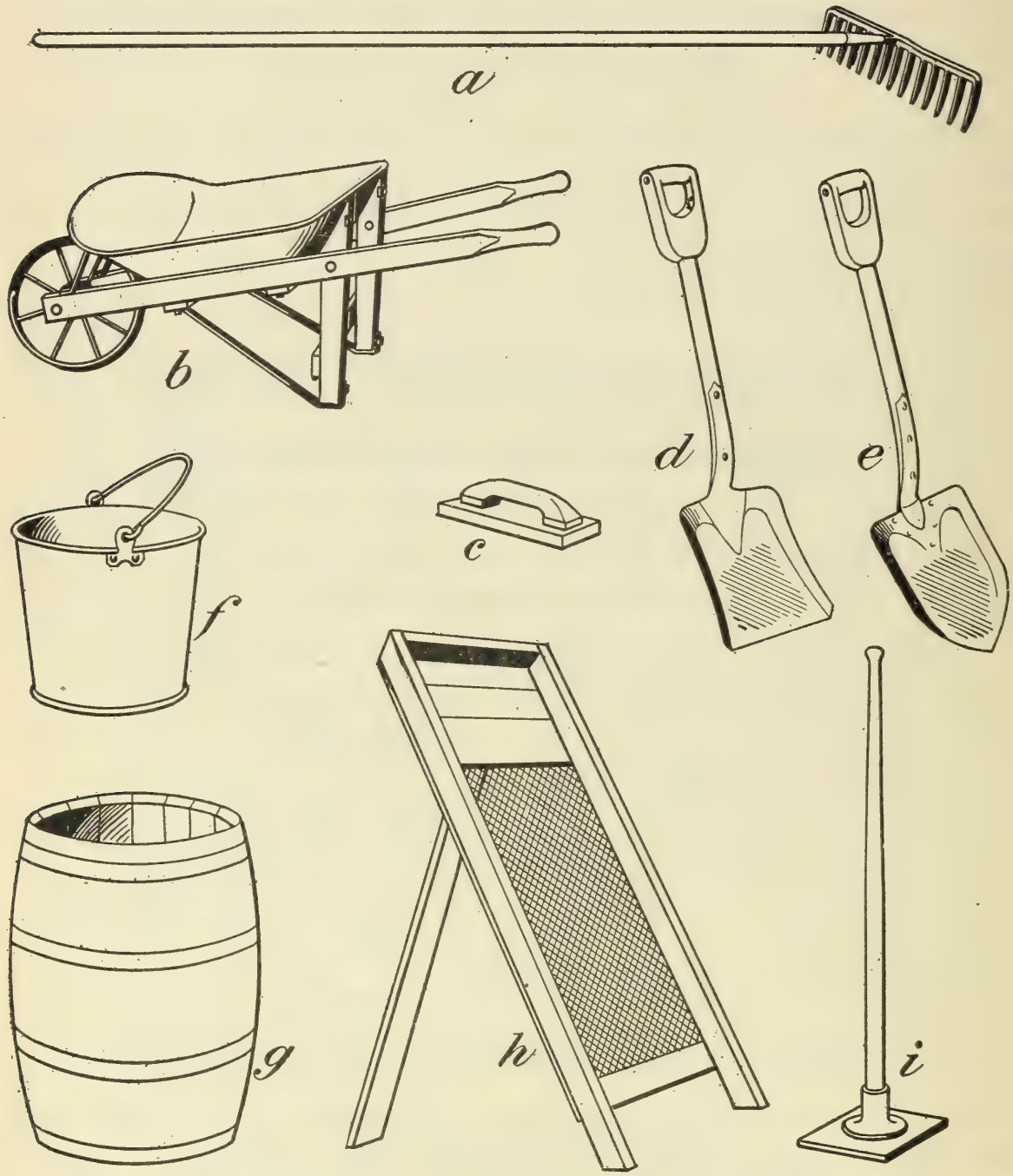

FIG. 3.—Tools used in making concrete on the farm: *a*, Rake; *b*, wheelbarrow; *c*, wooden float; *d*, square nosed shovel; *e*, round-nosed shovel; *f*, bucket; *g*, water barrel; *h*, gravel screen; *i*, tamper.

The size of the batch is dependent upon the number of men working and the dimensions of the mixing board or platform. For ordinary jobs sufficient room will be had on a "two-men board," 8 by 14 feet, framed solidly and built of matched one-inch stuff, with tight joints the short way of the board. Nail a wooden strip around the outside edge to prevent the loss of liquid cement. For such a

platform and a proportion of 1 to 5 or 1 to 2½ to 5 (see p. 9) use a measuring box of 1-inch stuff, 6 inches deep, 2½ feet wide, and 6 feet long. All measurements in the clear.

If the gravel does not need screening (see "The selection of materials," p. 7) place the bottomless frame, described above, on the mixing board and fill it level full with bank-run gravel. Lift the frame, spread the gravel slightly with a garden rake, and upon it distribute evenly three bags of cement, the full amount. Set the frame upon the leveled surface of the cement and gravel and again fill it with gravel. Remove the frame and level down the entire mass by dragging it back and forth with the rake. Two men opposite each other then turn the batch with No. 3 square pointed "paddy" shovels. Again use the garden rake and keep turning until the cement no longer shows in streaks. Throw up the frazzled edges and, with a sprinkling can or a hose with a spray nozzle, apply all the water the mixture will take up. Turn again and add a smaller amount of water. (The concrete should be sufficiently wet that when tamped into place a little liquid cement will come to the surface.) With wheelbarrows quickly remove the concrete to the site of the work and put it in place.

FIG. 4.—Measuring box.

If crushed rock or screened gravel is to be used fill the bottomless frame with sand and distribute upon it three bags of cement. Drag the materials back and forth with a garden rake, then turn in the manner described above until the mass has a uniform color. Apply water in a similar way. Spread out the wet mixture of sand and cement so that two framefuls of screened gravel or crushed rock may be placed upon it. Wet the mass and turn as for bank-run gravel until each stone is coated with cement mortar. Quickly remove the concrete to the work with wheelbarrows and place it.

GENERAL METHOD OF GRADING OR SLOPING FLOORS.

The floor must be graded or sloped, so that water will not collect and freeze on it in winter and so that the manure washings may be caught and run, by means of gutters made in the floor, to the watertight concrete manure pit. To illustrate a method of grading which

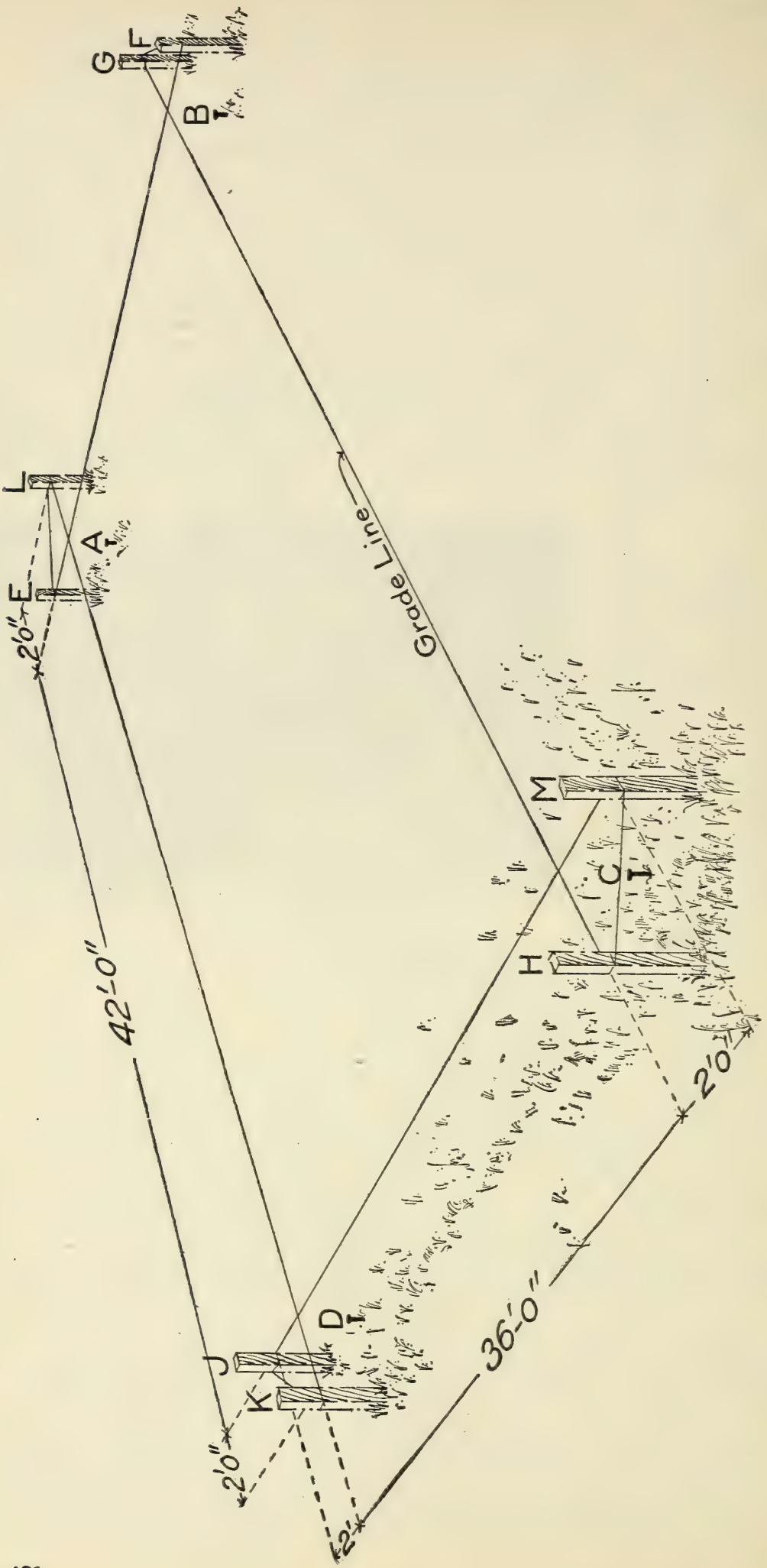

FIG. 5.—Grading the floor.

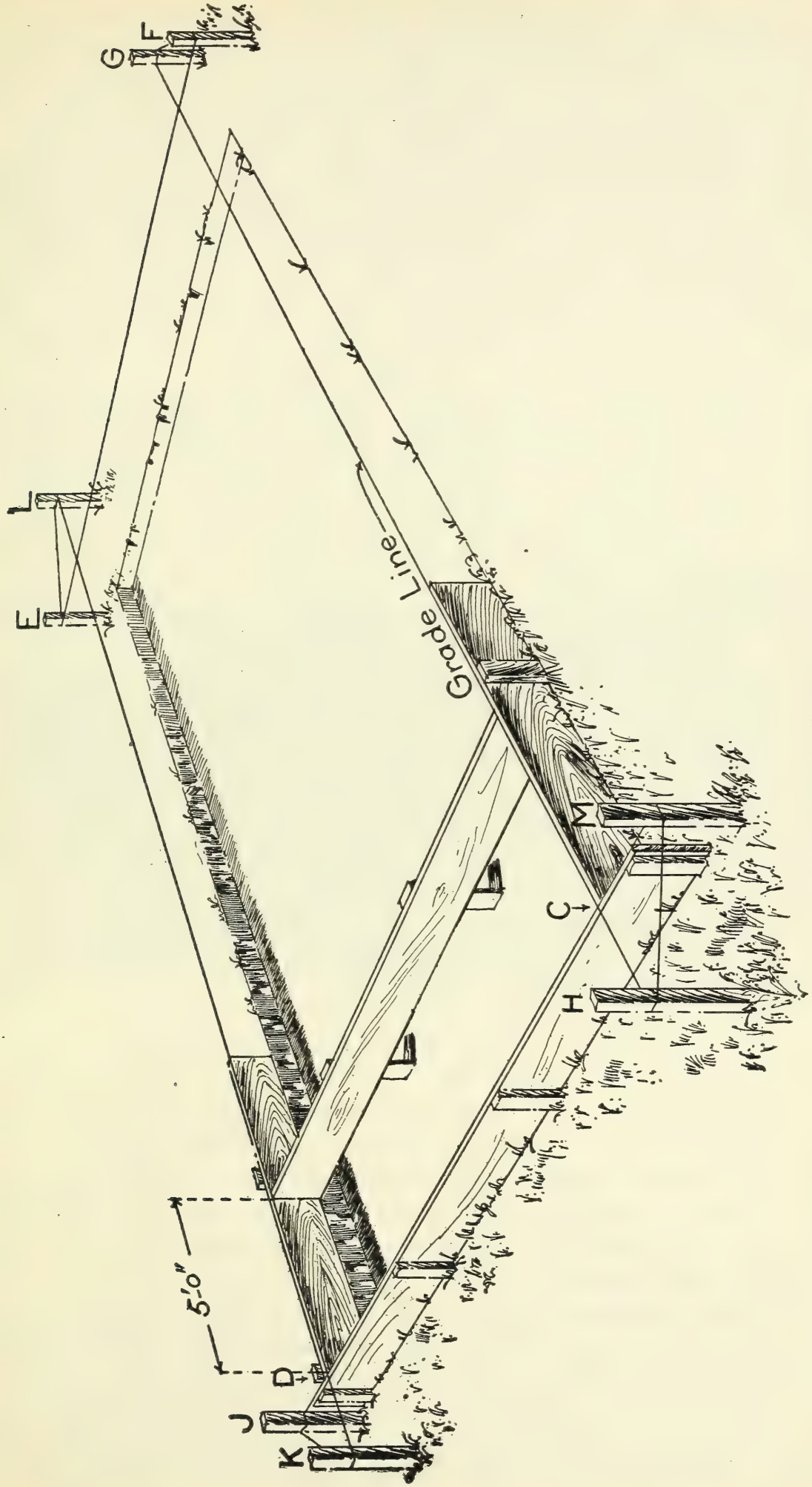

FIG. 6.—Forms for a feeding floor.

can be applied in general to all floors the following description is given for a feeding floor 36 by 42 feet:

Lay out the floor and mark each corner by driving a spike nail into the ground. To preserve the lines while working, stretch a string over the nails marking two sides—say *A B* (see fig. 5)—and drive stakes *E* and *F* with their faces to line exactly 2 feet beyond the corners of the floor. Likewise locate and drive stakes *G* and *H*, *M* and *J*, *K* and *L*. These stakes must be long enough to be driven firmly into the ground and to extend 12 to 15 inches above it. On stake *E* cut a notch 5 inches above ground level. By means of a straight edge or a tight chalk line, together with a carpenter's level, on *F* find a point level with the grade notch on *E*. Since the floor should have a slope of one-eighth inch per foot (for purposes of drainage) and the distance between *E* and *F* is $2+36+2=40$ feet, cut the grade notch on *F* forty eighths or 5 inches below the level mark. From the *grade notch* on *F* run a level line to *M*. The distance is 42 feet, therefore the grade notch is forty-two eighths or $5\frac{1}{4}$ inches below the level line. Returning to the grade notch on *E* run a level line to *J* and cut the grade notch forty-two eighths or $5\frac{1}{4}$ inches below the level line. Beginning at the grade notch on *E* stretch the chalk line to the grade notch on *F*, around *F* to *G*, around *G* to *H*, around *H* to the grade notch on *M*, from *M* over the line *G H* to the grade notch on *J*, around *J* to *K*, and around *K* to *L*. Raise and lower the line *K L* until it barely touches the lines *E F* and *J M* at points *D* and *A*. Do likewise to *H G* with reference to the points *C* and B. Thus adjusted the lines show the grade of the top of the finished floor.

GENERAL METHOD OF CONSTRUCTION.

The methods of constructing the several kinds of concrete feeding floors are so similar that, in general, they can be explained under one head. Special features of each kind of feeding floor will be discussed under separate topics. So many local conditions enter into the placing of watering tanks, feeding troughs, and dipping tanks and vats that little advice can be given on their location with respect to the floor other than that such things through their length usually govern the direction in which the floor will be laid in sections. Provision must be made for intake, overflow, and drain pipes for these tanks *before* the floor is laid.

With the grade line established by means of the string, as shown in figure 5, set the forms of 2 by 6 inch dressed lumber (or of whatever width the thickness of the floor calls for) along one of the *lower* sides (*D C* or *C B*), say *D C*. Let the forms project beyond *D* and *C*, as shown in figure 6, and nail them to heavy stakes driven solidly into the ground, so that the inside of each board at the top edge barely

touches the grade line. Two inches back of both *C* and *D* nail a cleat or block on the inside of the form along *D C*. Dig a trench 8 inches wide and 18 inches deep along the form *D C* on the inside and continue the same around the corners and 7 feet beyond in the direction of *A* and *B*. (This trench filled with concrete serves as an apron to keep out rats or water and to prevent undermining of the floor by hog wallows.) In the same way as the forms for *D C* were placed, set two shorter boards (say 12 feet long) to grade, one extending from *D* toward *A* and the other from *C* toward *B*. From points on top of these boards, 5 feet from *D* and *C*, stretch a cord, and then set the inside form to this temporary grade line.

FIG. 7.—Failure of a feeding floor on account of hog wallows. The floor should have had a lip turned down into the ground to prevent hogs from wallowing under it. However, note the value of jointing; the floor broke straight and can be repaired.

With the forms in place and all things ready, mix the concrete as directed under "The proportioning and mixing," page 9.

Always begin placing the concrete at the lower end of the section (in this case at *C*), so that rain from sudden showers will not run from the hard onto the newly placed concrete. Likewise, the set-up, finished floor may be sprinkled without water running upon the unfinished concrete. Fill the trench for the concrete apron as the floor is built. Without striking the forms, dump the wheelbarrows into the section and shift the concrete where needed with a tiling shovel or a garden spade. In tamping the concrete next to the forms or to the edge of a green section lay down a short, narrow board and strike it with the tamper. A wooden straightedge extending from form to

form will show when the section is at the right height. Smooth down the concrete with a wooden float—a 1 by 6 by 10 inch homemade trowel. No finishing mortar is needed for the top. When a portion of the floor has set sufficiently for the liquid cement to disappear, roughen the surface by brushing it lightly with a stiff broom, such as a barn broom or paving brush. With a trowel or a sidewalk edger bevel or round the outside edges of the floor.

As soon as one section is completed, if the concrete at the end first placed is hard enough to bear considerable pressure from the thumb, remove that part of the inside form, set it up to grade 5 feet distant, and proceed laying the second section. In tamping and in using the straightedge do not damage the adjoining floor. It sometimes happens that the first section when completed is too soft for any part of the forms to be taken down. In that case wait a half hour until the concrete has become hard, or leave out the second section and proceed to lay the third.

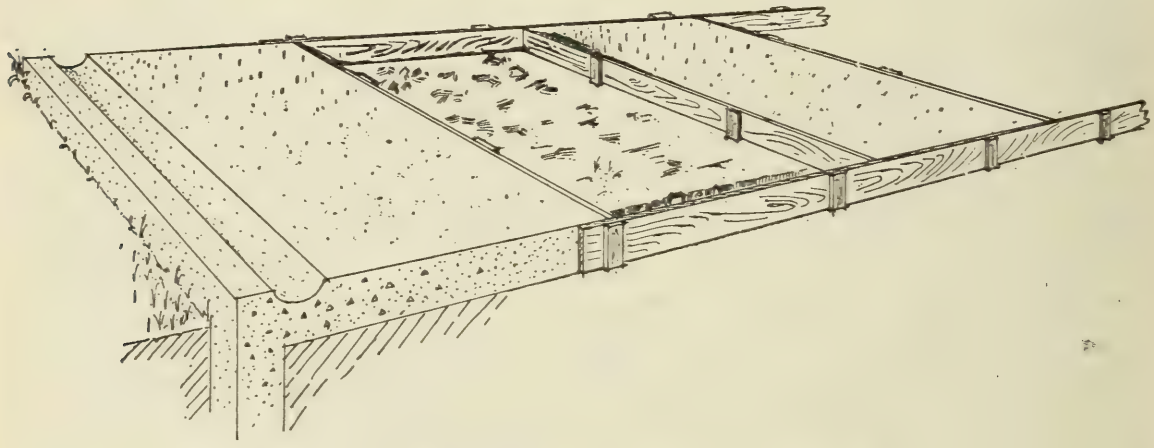

FIG. 8.—Feeding floor, showing trough to manure pit.

If tanks or troughs are to be made upon the floor and with the floor as the bottom of the tank, have the forms ready. To be watertight, such things must be built as one piece and at one time. Around the outside of the tanks, the same as for buildings, there should be built an 8-inch foundation wall extending 3 feet into the ground. A width of heavy woven wire in the concrete bottom (the floor) 1 inch from the under side and projecting up into the side walls will prevent cracks caused by faulty drainage foundations. The side walls of tanks should be well reinforced, 1 to 2 inches from the outside, with steel rods or heavy woven wire. To resist ice pressure, these walls should be heavier at the bottom than at the top, with the sloping face on the inside of the tank. For all tanks mix the concrete 1 to 2 to 4, according to the directions under "Shallow manure pits," page 21.

To insure getting the liquid manure into the pit, mold a gutter in the floor along its two lower sides, such as is shown in figure 8. To shape the gutter, make a mold or templet by rounding the corners of the flat side of a 4 by 6 inch timber. Four inches in from the edge,

on each of the lower sides, temporarily embed this rounded 4 by 6 inch gutter mold and tamp it down until its square top is even with the surface of the floor. Let the water enter the manure pit at the junction of these gutters. Use some arrangement, such as the trough in figure 8, for carrying off surplus rain water not needed in the manure pit.

Should the work be interrupted, even for the noon period, place a board crosswise of the section similar to an inside form, and thus bring the concrete to an abrupt end.

Do not mix concrete until it can be used at once. Concrete which has been mixed for 30 minutes is unfit for use even though remixed or retempered with fresh cement and water.

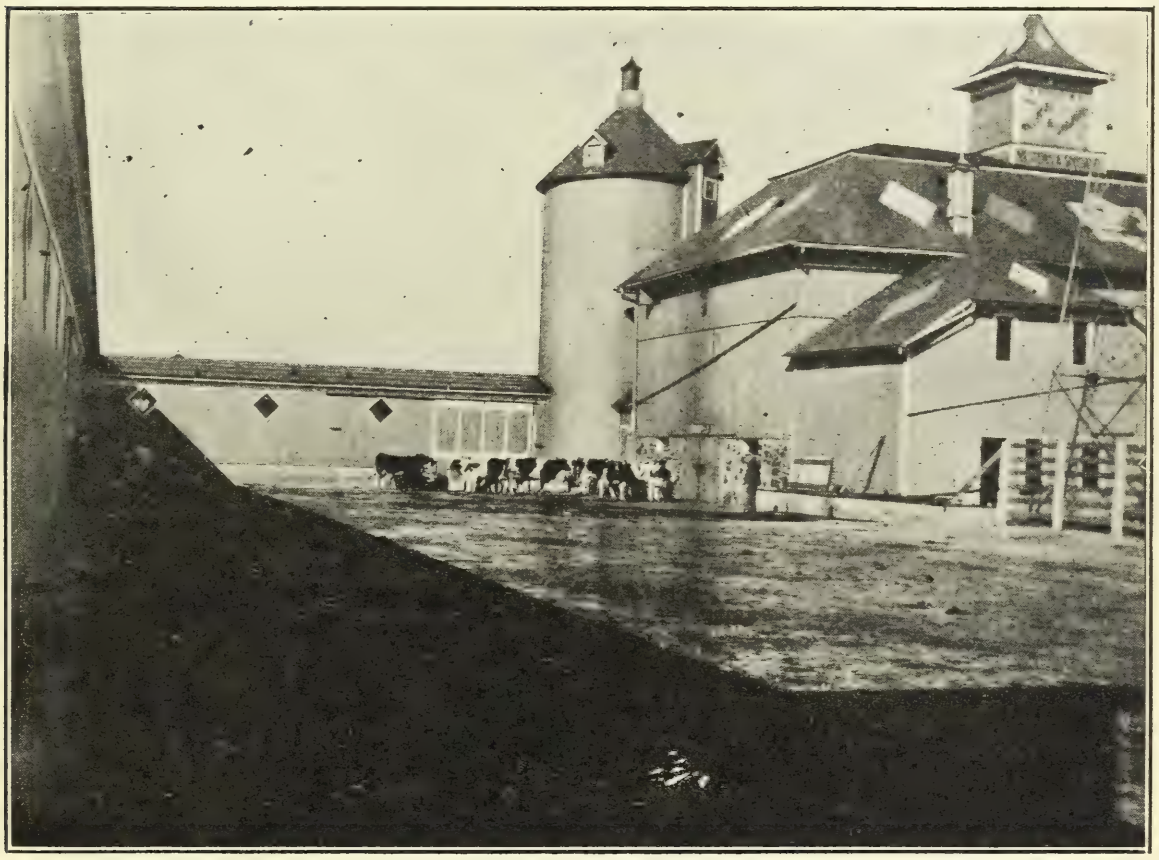

FIG. 9.—A good cattle feeding floor.

Concrete work may be carried on during freezing weather by heating the water or the sand and the stone. However, it is advisable not to attempt work when the thermometer registers 32° F. or lower. Often, when the temperature is above this point, concrete is frozen and ruined because frosty gravel from a frozen pit is used.

CURING THE FLOOR.

Proper curing of the floor is as important as thorough mixing of the concrete. In hot weather keep a new section shaded for 3 days. In any season, as soon as the concrete has set up so that water will not wash out the cement, sprinkle that portion of the floor and keep it well wet for 48 hours. Thereafter flood it with water morning and

noon for a week.[1] At the end of that time the floor may be used for strictly feeding purposes, but must not be subjected to heavily loaded wagons for a month. While the floor is new keep loose animals off its surface.

FEEDING FLOORS FOR CATTLE.

Make feeding floors for cattle 5 inches thick. If the dimensions of the future racks are known, they may be securely fixed in place by setting short lengths of gas pipe in the floor into which iron pins or bolts are later inserted to lock the racks to the floor.

If watering tanks and feeding troughs and racks are located on the floor, see instructions governing the same under "General method of construction," page 14. Likewise for dipping vats, see "Concrete dipping vats," page 26.

FIG. 10.—Cattle and hog feeding floor.

FEEDING FLOORS FOR HOGS.

Feeding floors for hogs should be 5 inches thick. See that the concrete apron around the edge extends deep enough into the ground that the hog wallows will not undermine the floor and cause it to break off.

Watering and feeding troughs for hogs are, as a rule, merely long, shallow concrete blocks, hollowed out to a V shape or U shape.

The outside form is a heavy box with vertical sides and ends. To get the full capacity of the trough, use a carpenter's level to set the outside form. On account of the slope of the floor, it will be necessary to tack a strip on the outside of this form to cover the cracks between the

[1] As soon as the floor is hard enough to stand it, some farmers prefer to bed it down well with clean straw or hay and to keep the straw wet.

floor and the level form. The inside shape is given by a core made by tacking together two boards along one edge. Bevel these boards at the joint, so as to give a round shape to the bottom of the finished trough.

As soon as the concrete floor is laid where the trough is to be located immediately set the outside trough form in place. The core is then placed in the outside box form and spread at the top until it has the same vertical height as the outside form. To keep the forms in their proper position, nail crossties to both. Make the top edge of the finished trough at least 3 inches thick. To fill the forms through this small opening, mix the concrete wet enough to pour and add a little extra cement.

FIG. 11.—A good hog feeding floor.

Another method of building this same trough requires an outer form only. Mix the concrete dry enough that it may be tamped against the side of the form into the V shape or U shape desired. Paint the inside at once with cement and water mixed to the stiffness of cream.

Use 2-foot lengths of 1-inch gas pipe, crosswise, as shown in figure 12, to keep the hogs out of the trough. For holding the pipe in position, set ½-inch bolts in pairs, heads down, in the soft concrete so that the pipes will fit between them and can be held firm by a strap iron over the bolts. For this purpose choose ½-inch bolts of sufficient length to extend 4 inches into the concrete. Space the cross pipe 12 to 16 inches apart.

Post holes, for a removable fence of woven wire on 1-inch gas pipe, may be made by setting in the floor, flush with the surface, short lengths of 2-inch gas pipe or small drain tile. Such a temporary fence will keep the poultry off the floor until the hogs have finished their feed.

If a dipping vat is to be built in connection with the floor, see "Concrete dipping vats," page 26.

FEEDING FLOORS FOR SHEEP.

Feeding floors for sheep are built the same as for hogs. For the method of fixing feed racks see instructions governing the same under "General method of construction," page 14.

FEEDING FLOORS AND SWIMMING POOLS FOR POULTRY.

Unless subject to heavy wagon traffic, a 3-inch thickness is sufficient for concrete floors for the poultry yard. Construct dust boxes and swimming pools in the manner laid down for watering tanks and feeding troughs under "General method of construction," page 14. However, it is better to build the swimming pool just off the floor.

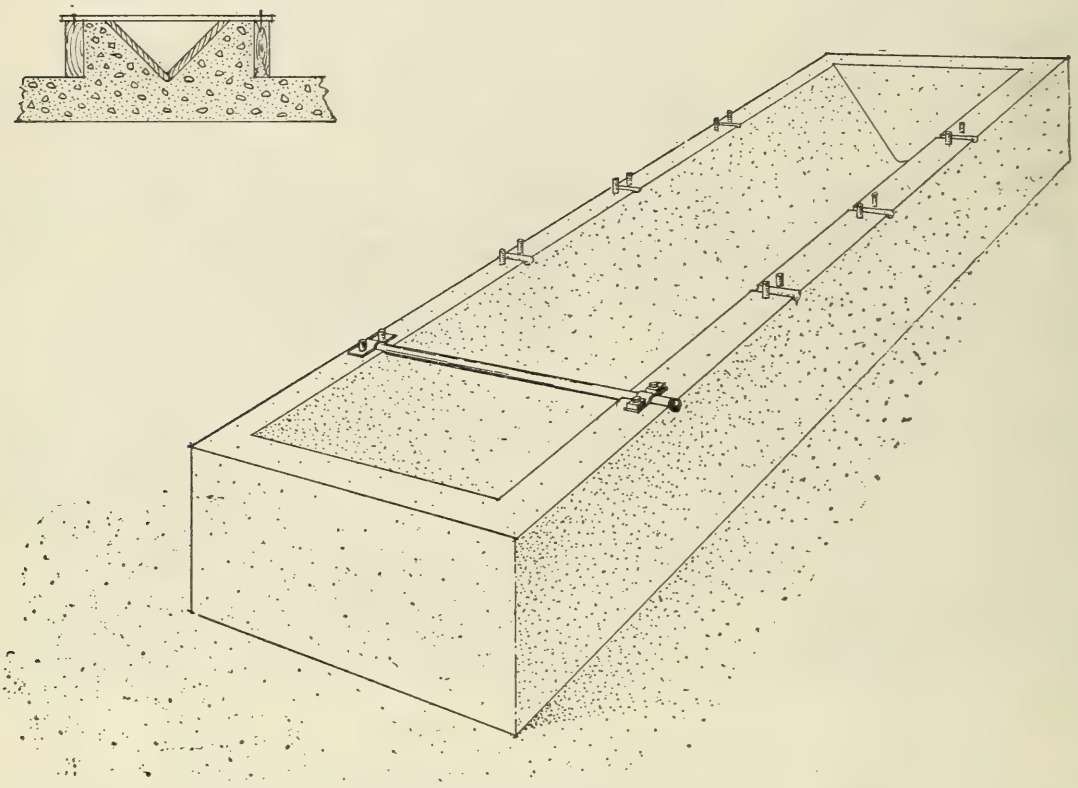

FIG. 12.—Feeding trough for hogs.

For a pool dig out a basin 8 inches deep, and lay the necessary pipe and drains. Place the concrete in sections 4 inches thick and embed in it, 1 inch below the surface, widths of woven-wire fencing. At the edge of the pool extend the concrete above the ground into a curb so as to make the pool as deep as desired.

THE COST OF CONCRETE FLOORS.

The cost of a concrete floor is dependent upon so many conditions that no exact estimate can be given. The price of materials and labor vary considerably in different sections. And, most important, the managing ability of men is never the same in two instances. In general, however, for 1 square foot of surface the cost in cents is equal to the thickness of the floor in inches. For instance, a floor 5 inches thick will cost 5 cents per square foot of surface

CONCRETE MANURE PITS.

ORDINARY METHODS OF STORAGE WASTEFUL.

For maintaining or restoring the fertility of the fields, there is nothing better than barnyard manure. By the ordinary methods of piling manure on the ground or storing it in wooden pens and boxes, 30 to 50 per cent of its fertility is lost. This loss is brought about in two ways: First, by leaching or washing due to heavy rains; second, by fermentation or heating caused by lack of sufficient moisture. Since concrete pits are waterproof, manure may be kept in them as moist as may be necessary and such an enormous waste in the fertility of the manure may thus be entirely prevented. One load of

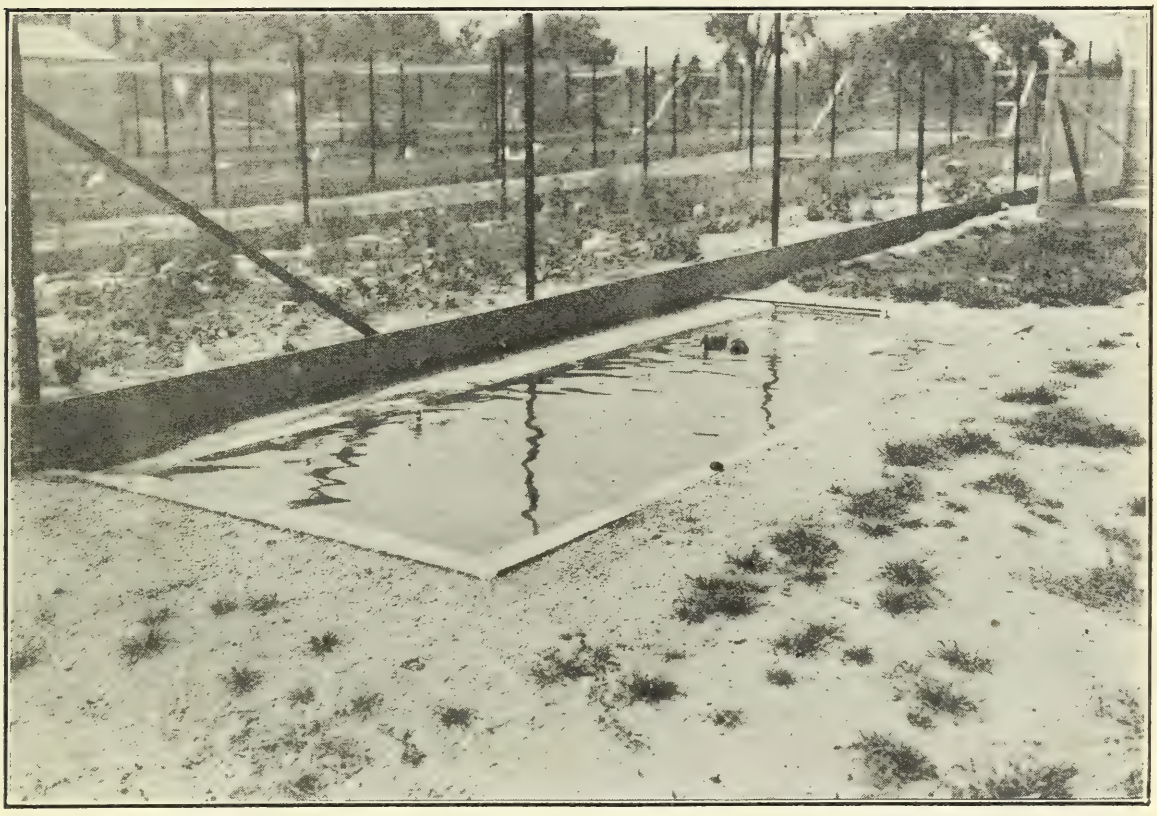

FIG. 13.—Concrete swimming pool for ducks and geese.

manure from a concrete pit is worth $1\frac{1}{2}$ to 2 loads of manure as usually stored. Moreover, with concrete pits the supply of manure is increased by all the liquid manure, the richest part, from the barn gutters and feeding floors.

SHALLOW MANURE PITS.

Shallow manure pits do very well where the manure can be frequently hauled to the fields. In figures 17, 18, and 19 are shown plans for such a pit adjoining a feeding floor. The walls and floor are 5 inches thick. The clear dimensions of the pit are: Depth, 3 feet; width, 6 feet; length, 12 feet. Dig the trench 3 feet 5 inches by 6 feet 10 inches by 12 feet 10 inches. By keeping the sides vertical only an inside form will be needed. Frame the sides and ends separately. For the sides cut the 1-inch siding 12 feet long and nail

it to four 2 by 4 inch uprights 3 feet long and equally spaced. The end uprights for the sides are 2 by 4 inch pieces nailed flat to the siding; the others are also 2 by 4 but are nailed on edge. It is not necessary to cut these uprights to exact lengths; they may be allowed to extend above the siding. Make the siding for the end sections of the form 5 feet 2 inches long and at the ends nail it to the edge of two 2 by 4 inch uprights. Place a single 2 by 4 upright between each end pair. Cut four cross braces, 5 to 10 inches long, from 2 by 4 inch timbers. Have enough sections of woven-wire fencing, 7½ feet long, to cover the bottom of the pit.

FIG. 14.—Old-fashioned method of storing manure, a large proportion being wasted by heating and leaching.

Mix the concrete 1 to 4 or 1 to 2 to 4, according to instructions on page 9. For measuring the materials use the same bottomless frame[1] described on page 9, but in this case for each batch of concrete increase the number of bags of cement to four. Crosswise, tamp in a section of concrete (not too wet) 2 inches thick and a little wider than the strip of woven-wire fencing used as reenforcing. Lay the wire with an even division of the extra length, so that it may project upward into the side walls. Tamp in the remaining 3 inches of concrete. Work rapidly and complete the floor. No facing mortar is needed.

Immediately set up the forms on the finished floor so as to allow a 5-inch wall on all sides. Join them by nailing together the 2 by 4's

[1] This box lacks three-eighths inch in height for an exact 1 to 4 or a 1 to 2 to 4 mixture. But the shortness is in sand and gravel (or rock) and merely makes a better concrete.

at the corners of the sides and ends. Do not drive the nails home. Cross-brace with 2 by 4's and with 1-inch boards from each central end upright to the second side upright.

Quickly begin filling the forms with concrete almost wet enough to pour, and keep it practically the same height on all sides. Puddle the concrete by running a long paddle up and down next to the form. Do not punch the earthen wall. Dirt in the concrete may make a poor wall. If the top of the earthen wall tends to crumble, hold it back with 1-inch boards braced against the forms. To keep out flood water, the pit may be extended 6 inches above the ground by using the lower half of a 1-foot board to hold back the dirt, by allowing the remainder to project above the ground level, and by adding

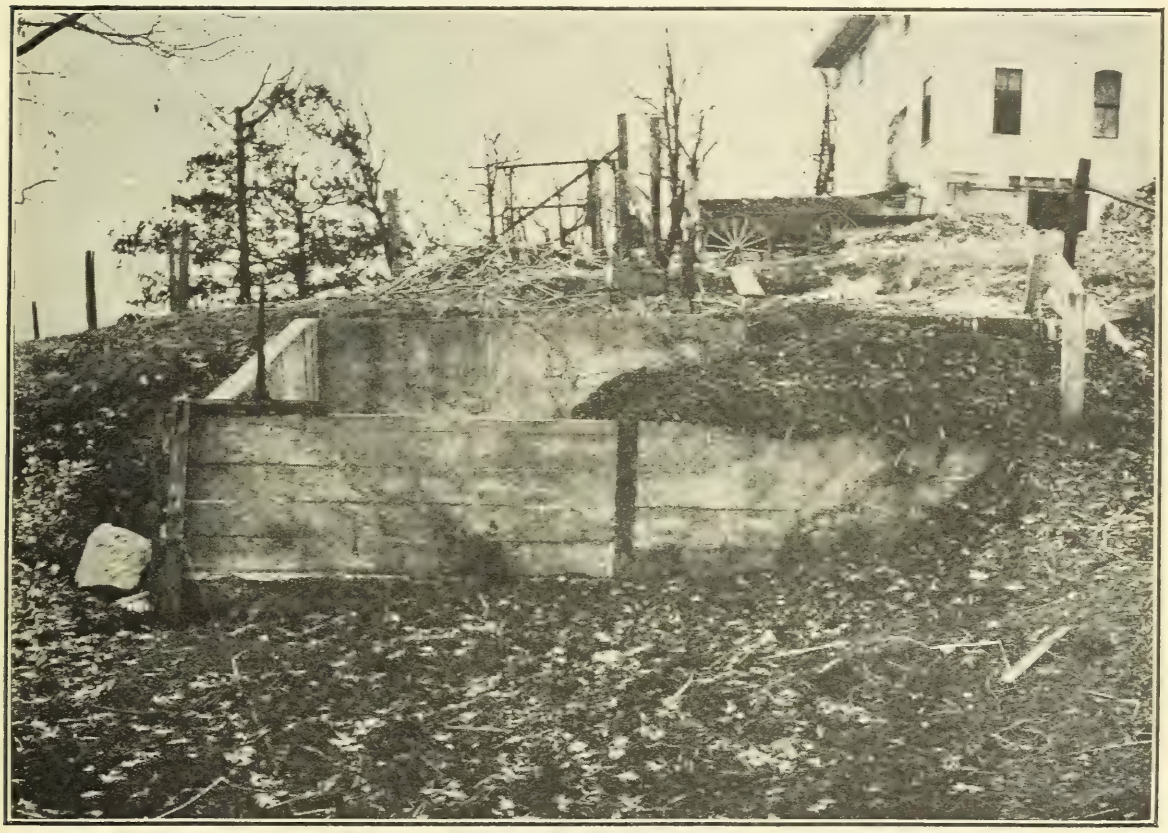

FIG. 15.—A concrete manure pit, by which all the manure may be saved.

6 inches to the height of the inside form. Remove the forms after the concrete has set four days by first drawing the nails in the corner 2 by 4's. The pit may be used after 10 days.

MANURE BASINS.

Where manure must be stored for a considerable length of time, larger pits or basins are required. Such pits are seldom made over 5 feet deep (in the clear at the deeper end) and are wide enough that the manure may be loaded on a spreader in the pit and drawn up a roughened concrete incline or run. The slope for such a run must not be steeper than 1 foot up to 4 feet out.

In building such a basin as planned in figure 15, use a team with a plow and scraper to make an earthen pit in which to build a concrete

basin of the clear dimensions shown. In laying out the earthen pit, bear in mind that the concrete walls and floor are 8 inches thick and make due allowance for the same. With a spade trim the sides and the deep end vertical.

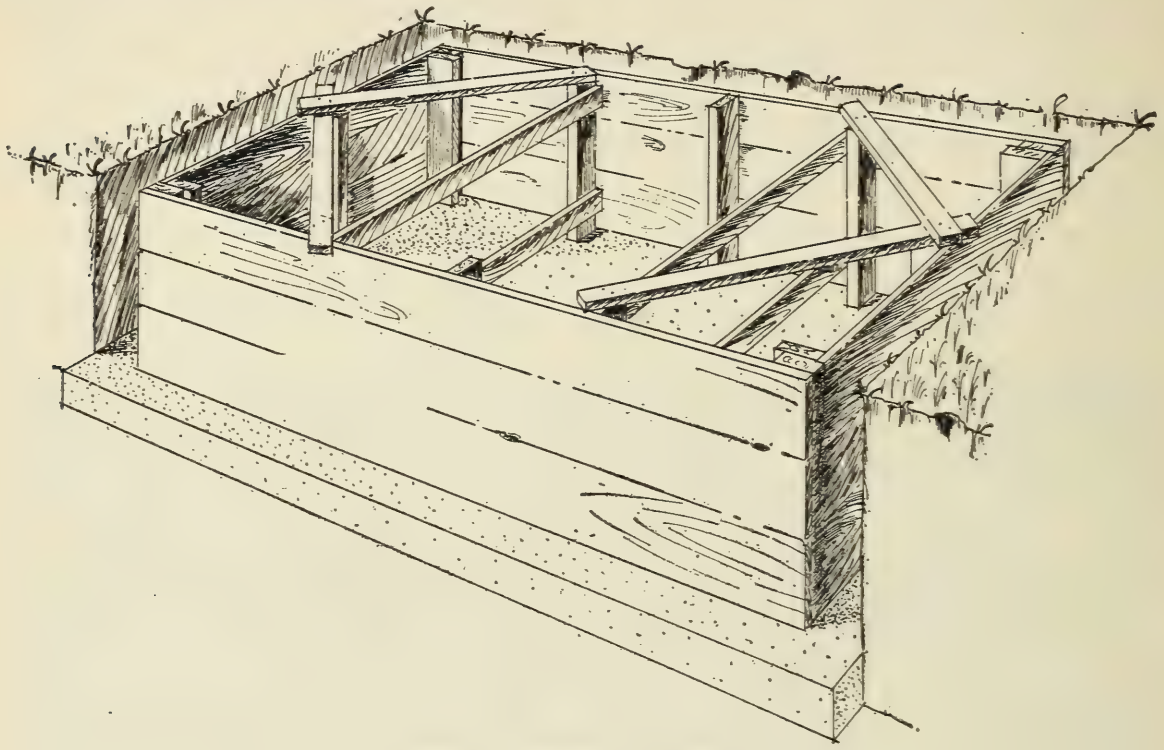

FIG. 16.—Manure pit forms.

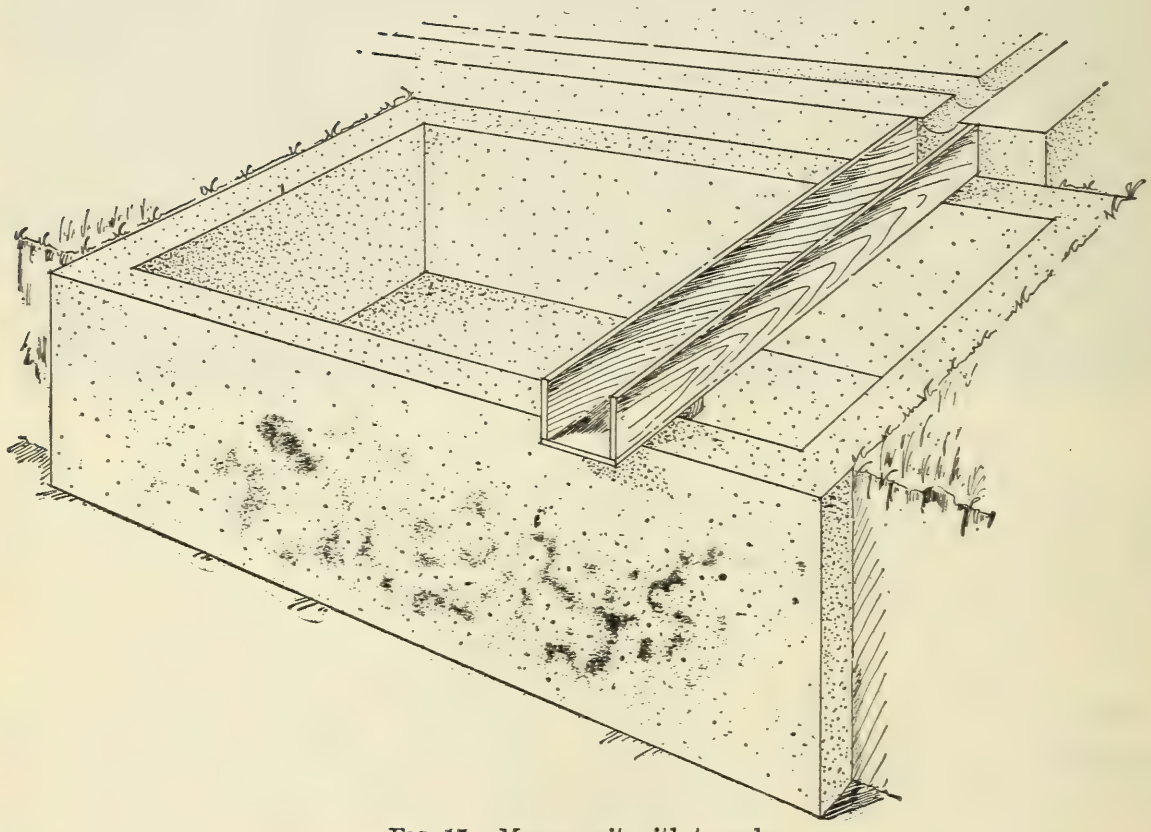

FIG. 17.—Manure pit with trough.

In order to form a sump hole from which the liquid manure can be pumped, in one corner at the deep end of the pit dig a hole 18 inches deep by $2\frac{1}{2}$ feet in diameter. To protect the concrete floor, at the upper end of the driveway excavate a trench 8 inches wide and 2

feet deep for a concrete foundation apron. Extend it around the corners and slope it upward to meet driveway incline.

In general, the framing of the forms is similar to that of shallow pits. If the earthen walls stand firm, only an inside form will be needed. Otherwise, build an outer form. For the forms use 1-inch

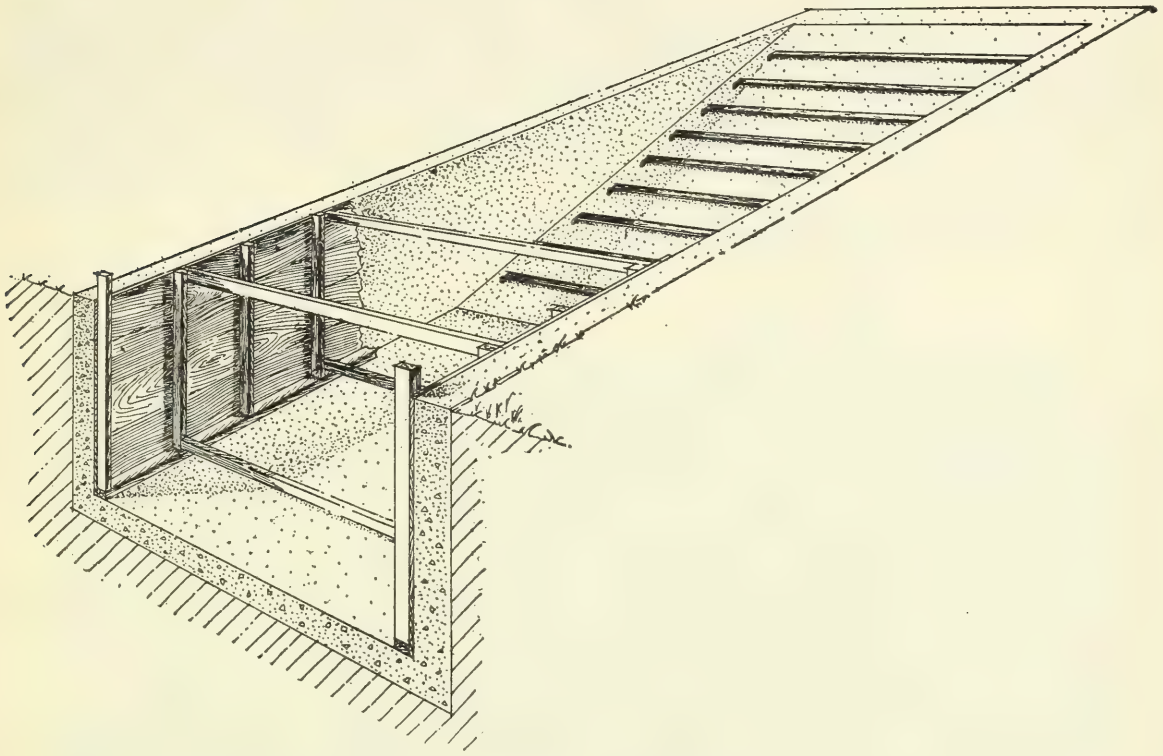

FIG. 18.—Shallow manure pit.

siding on 2 by 4 inch studding spaced 2 feet 8 inches. These uprights need not be cut to exact lengths. Save lumber by allowing them to extend above the siding. Stiffen each section of the form by nailing a 2 by 4 inch scantling to the uprights at top and bottom of the forms.

Erect the forms in the pit. Set them on 8-inch concrete blocks or bricks, so that the floor may be built under them. To prevent

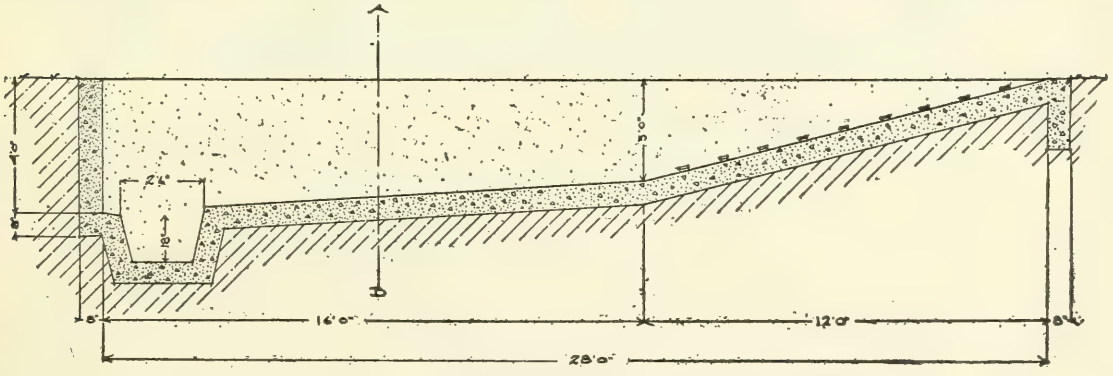

FIG. 19.—Section of shallow manure pit.

bulging, cross-brace the forms with 2 by 4 inch timbers. Begin filling with concrete, as for "Shallow manure pits," page 21, and do not stop until the job is completed.

Lay the floor for the bottom and the incline the same as for shallow pits. To give teams a sure footing on the incline, embed in the con-

crete the turned-up ends of iron cleats bent at right angles, similar to a capital U. Old wagon tires, cut in lengths not greater than 20 inches and turned up 4 inches at each end, will do. Leave 1 inch clearance between the cleats and the concrete, and set them so as not to obstruct the wheelway. Space the cleats 14 to 16 inches. Roughen or corrugate the bottom crosswise every 6 inches by using a 5-foot length of 2 by 4 inch scantling beveled lengthwise to the shape of a carpenter's chisel. To make the corrugations, set the timber with the beveled face toward the incline. Strike the 2 by 4 with a heavy hammer, so as to indent the concrete to the depth of 1 inch.

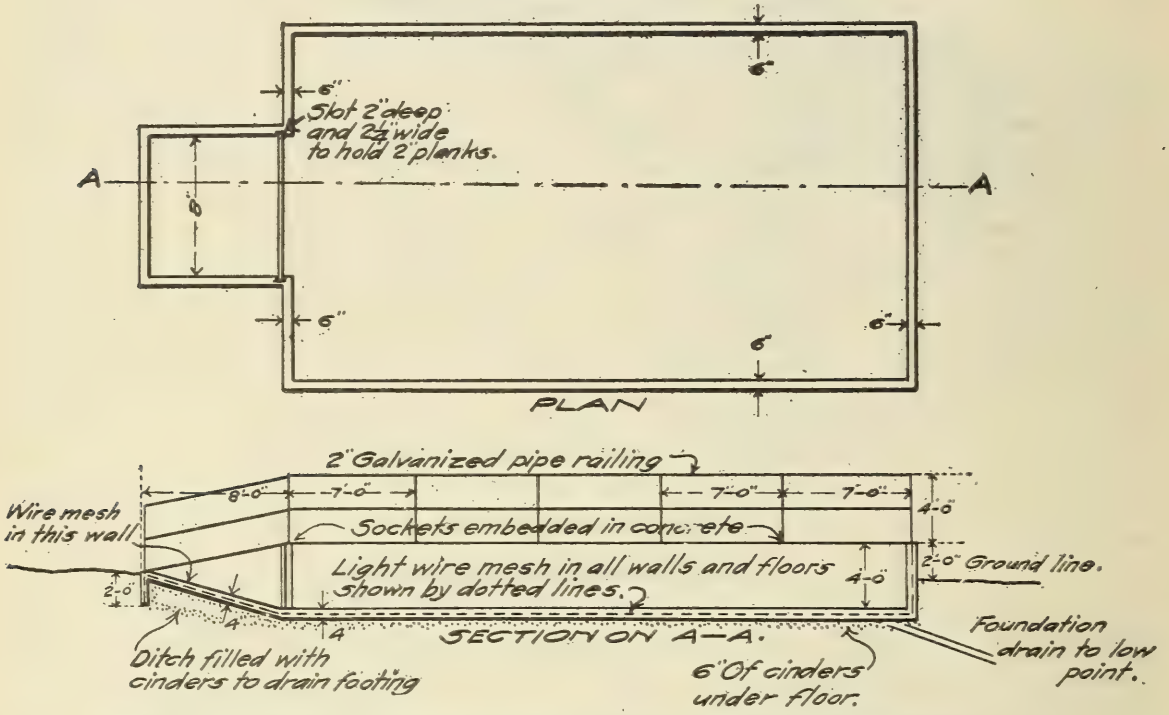

FIG. 20.—Drawing of a manure pit for the Morgan Horse Farm, Middlebury, Vt.

CONCRETE DIPPING VATS.

Dipping in certain solutions has been found to be the most effective means of ridding animals of vermin which infest the skin, such as the Texas-fever cattle tick, the scabies mite, lice, etc.

The "dips," as these remedies are called, are best applied by forcing the animals through vats containing solutions of them. Under average farm and ranch conditions the actual cost of dipping is very small. Of this cost the dipping solution, ready for use, makes up the greater part. Since it must be applied once or twice yearly, and the vat, of necessity, must be sunk in the ground, a water-tight vat of some permanent material is needed. On account of its lasting qualities, concrete has been found to be an excellent material for dipping vats.

There are five important points to be considered in the building of a dipping vat:

(1) A blind chute—an inclined chute with a turn, so that the animal can not see where he is going.

(2) An entering slide, steep enough to shoot the animal in, without a full drop. A direct drop, the entire depth of the tank, is liable to injure the animal.

(3) The vat must be narrow enough to prevent the animal turning around, long enough to keep him in from one to two minutes, and deep enough not only to force him to swim, but also to make him disappear entirely when he takes the plunge.

(4) The slope at the leaving end must be gentle and its surface roughened or cleated, so that the animal may easily climb out to the dripping pens.

(5) As the liquid dip is the most expensive part of the operation, there should be provided two dripping pens draining into a settling tank or trough.

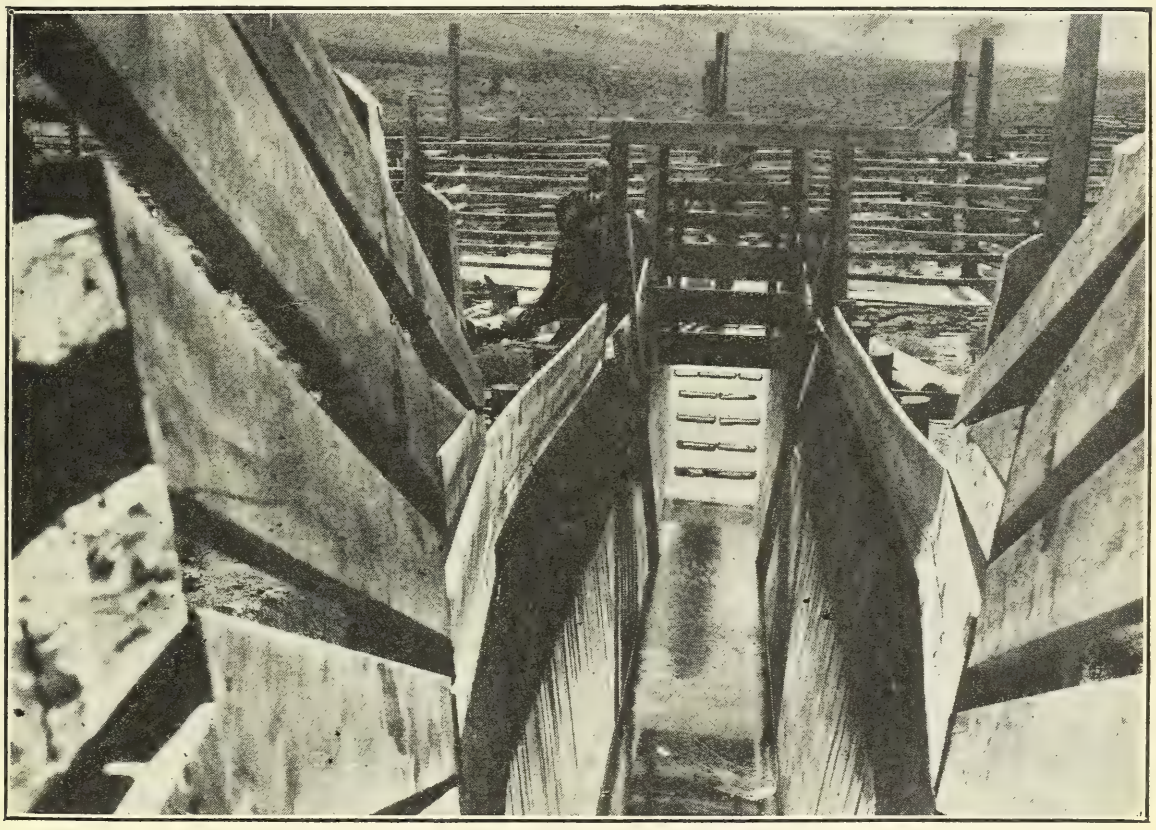

FIG. 21.—Concrete horse and cattle dipping vat, showing "soaking gate" raised. This vat may be transformed into a sheep vat by running a wooden partition the length of the vat. The cleats at the far end are made of wagon tires.

In locating the dipping vat, select a well-drained site handy to a water supply and convenient for a chute leading from a small, well-fenced lot or corral. (Consider also the means to be used in heating the dip in case this is required.) At the narrow end of the chute and in line with it, lay out the dipping vat with the entering slide abutting the chute. Often the chute is built on a curve, so that the animals can not see what is ahead of them.

One shape, with modifications as to size, is common to dipping vats for horses, cattle, sheep, and hogs. The vat is merely a box with sloping ends to make easy the animal's entering and leaving. From

the table on page 32 and the plan shown in figure 24, choose the proper dimensions according to whether the tank is intended for horses, cattle, sheep, or hogs.

The lengths given will keep the animal in the vat one minute, which is usually a sufficient time. Where a longer treatment is desired, most ranchmen, instead of building vats of greater length, provide a drop gate working in a groove and controlled by a rope over a pulley, by means of which the animal is kept in the vat as long as necessary. Likewise, rather than build a separate vat for sheep and hogs, stockmen insert a temporary division fence, running the full length and depth of the cattle and horse vat. This fence should be solid and so spaced as to prevent hogs and sheep from turning

FIG. 22.—The same vat; view in opposite direction, showing "soaking gate" lowered for use.

around in the vat. In this way a single dipping vat may be used for horses, cattle, sheep, and hogs.

Dig the deep part of the hole first, and then slope the earth for the slide and climb. Lay the outlet drain pipe so that the top of the elbow bend will be even with the surface of the finished concrete bottom. Tamp back the dirt thoroughly about the drain tile before placing the concrete. If a pump or a steam siphon is to be used to remove the dip, slope the earthen bottom to a sump hole in which the pump or siphon pipe can be set.

The side walls only will require forms. If the banks stand firm, inside forms alone will be needed. Otherwise, cut away the banks so long as they crumble, and build an outside form similar to the inner form, but enough larger to provide for the thickness of wall required.

Make the inside form of 1-inch boards on 2 by 4 inch uprights. Mix the concrete 1 to 2 to 4 (according to directions under "Shallow manure pits," p. 21), and lay the floor and slopes directly on the solid earth. No fill or drainage foundation is necessary. The concrete for the sloping ends should be mixed fairly dry so that it will tamp well and stay in position without the use of forms. With the bottom and slopes built, lower the side-wall forms into the pit. Take care to jar no dirt upon the concrete already placed. Space the forms properly and cross-brace them firmly upon each other. Fill the wall space with concrete mixed mushy wet. For large vats, set the forms before laying the floor, as directed under "Manure basins," page 23.

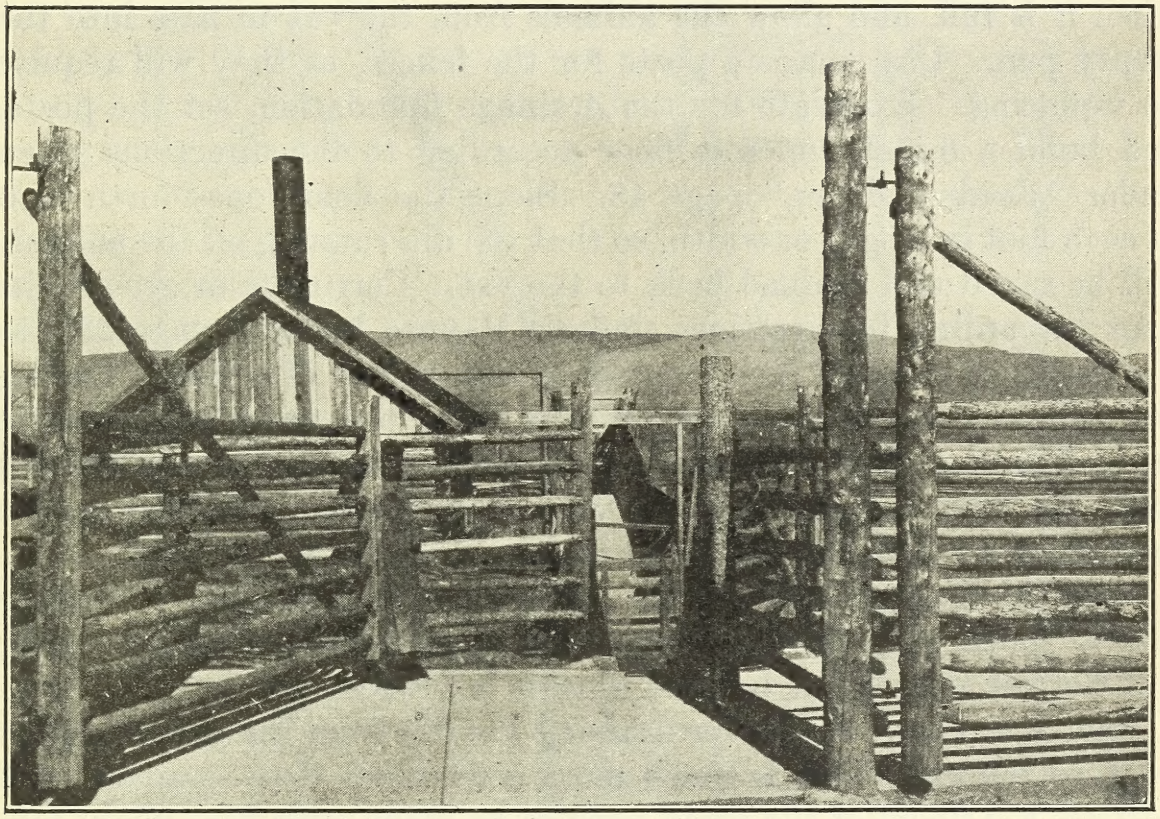

FIG. 23.—The same vat, showing double draining pens and arrangement of gates. Note shifting gate and boiler house with steam pipe leading to vat.

In placing this concrete, be sure that it strikes the wood form instead of the earthen side, as concrete mixed with earth makes a weak, leaky wall. Carry the walls 6 inches above the surrounding ground to prevent flood water from running into the vat. Have everything at hand and work rapidly, so that the whole vat may be finished at one time and without stopping.

The entrance slope should be smooth to slide the animals into the vat without skinning them up. Finish this surface with a wooden float and a steel trowel. Some ranchmen prefer to cover the entire slide with a polished steel plate, the edges of which are sunk into the concrete when the slide is built. If preferred, bolts may be set in the green concrete slide, clear of the animal's path, to which the steel

plates are later bolted. To aid the animals in climbing out, embed in the concrete the turned-up ends of iron cleats bent at right angles similar to a capital U. Old wagon tires, cut in lengths not greater than 20 inches and turned up 4 inches at each end, will do. To better the footing, leave 1-inch clearance between the flat surface of the cleats and the concrete. Space the cleats 18 to 20 inches for horses and cattle and 10 to 12 inches for sheep and hogs.

DRAINING PENS.

At the leaving end of the vat, lay out the two dripping pens with their division fence on a line with the center line of the vat, so that the gate at the dipping vat, hung to this fence, may close either pen, when it is full, and allow the animals from the vat to pass into the empty pen. Use concrete posts for the fences, as they will require no replacing. Excavate for the drainage foundation, set the posts, and build a 6-inch concrete floor according to the directions given under "Feeding floors," page 18. Slope the floors one-fourth inch to each foot in length or width, so that the dip running off the animals will be saved and drained back to the vat. Corrugate or groove the floor (according to directions under "Manure basins," page 23), to the depth of one-half inch every 8 inches, in one direction. During the construction of the floor, mold around the outside a concrete curb, 6 inches above the floor and 4 inches wide. Where the dip from the floor empties into the vat, place a removable wire screen or strainer to keep the droppings and wool tags out of the vat.

Cure the floors and slopes according to directions under "Feeding floors," page 17. The wall forms may be removed after one week, but the vat should not be used until it is 3 weeks old.

Figure 24 shows a plan for draining the dip from the draining pens back to the vat which is much more convenient than strainers, and permits the floors of the drain pens to be made with very slight fall, thus preventing the animals from crowding to the rear of the drain pens after being dipped.

A shallow trough, about 8 or 10 inches deep and 8 inches wide, is made from the side of the incline from the vat along the edge of the drain pen, or in the case of a double pen, on both sides of the incline. At any convenient point, insert a 2-inch iron pipe into the trough, 2 inches below the top of the trough, and run this pipe to the vat. The dip drained from the animals will run to the trough, the solid matter washed into the trough will settle to the bottom and the liquid will drain through the pipe back into the vat. As solid matter accumulates it is shoveled out of the trough. By making a hole in the far end of the trough and inserting a plug, rain water can be drained away from the vat when it is not in use

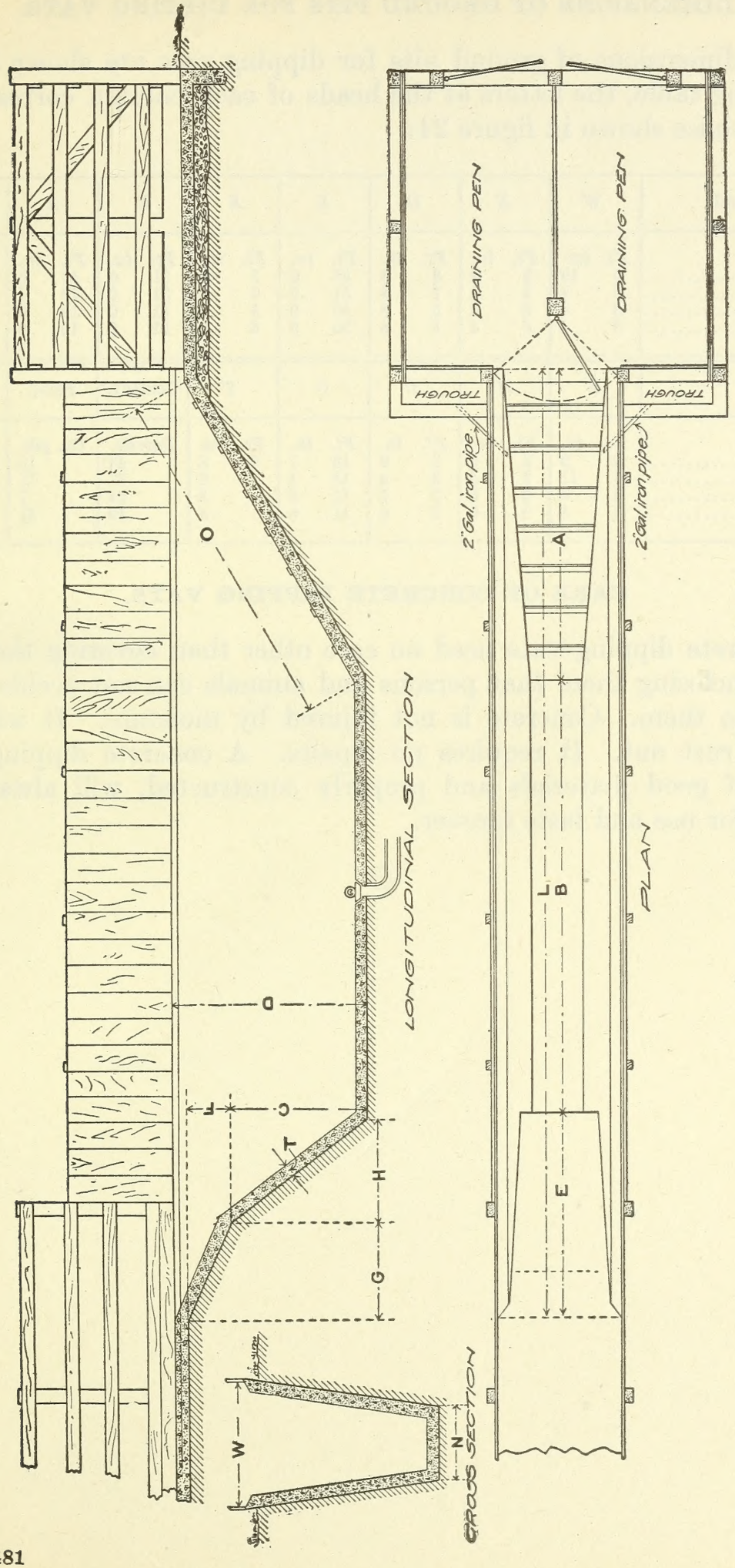

FIG. 24.—Details of construction of a dipping vat.

DIMENSIONS OF GROUND PITS FOR DIPPING VATS.

The dimensions of ground pits for dipping vats are shown in the following table, the letters at the heads of each column corresponding to those shown in figure 24:

Kind.	*W*		*N*		*D*		*L*		*E*		*B*		*A*		*G*	
	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*
Horses	5	10	3	4	8	8	55	0	7	6	31	0	16	6	3	9
Cattle	5	4	3	4	7	8	51	0	6	8	31	0	13	4	3	4
Sheep	3	4	2	4	5	8	46	0	5	0	31	0	10	0	2	6
Hogs	3	4	2	4	5	8	36	0	5	0	21	0	10	0	2	6

	F		*H*		*C*		*O*		*T*		Cement.	Sand.	Rock.
	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Barrels.*	*Cu. yds.*	*Cu. yds.*
Horses	2	2	3	9	3	9	18	7	0	8	43	13	26
Cattle	1	11	3	4	3	4	15	4		8	37	11	22
Sheep	1	5	2	6	2	6	11	6		8	24	7	14
Hogs	1	5	2	6	2	6	11	6		8	19	5½	11

CARE OF CONCRETE DIPPING VATS.

Concrete dipping vats need no care other than covering them up or so inclosing them that persons and animals can not accidentally fall into them. Concrete is not injured by moisture. It will not rot or rust out. It requires no repairs. A concrete dipping vat, built of good materials and properly constructed, will always be ready for use and lasts forever.

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